ABSTRACT

A microfluidic system has an electroosmotic flow (EOF) pumping means for propelling fluids through a series of microchannels and selection valves. Pump channels are configured in groups which may be fabricated singly or in multiple groups onto a substrate. A bubble-free electric connection joint provides for the application of voltages across pump channels while simultaneously blocking the passage of fluids through the joint. Bubble-free electrodes are also provided to prevent electrolysis and bubble formation in or close to the microfluidic channels. The selection valves provide for routing functions within the microfluidic system and can also be configured to route fluids outside the system. A rate monitoring system is provided for determining and compensating for system flow rates. In one application the microfluidic system may be configured to operate as a small volume pipettor or other fluid transport or analysis device. A pipettor washing device is provided to facilitate complete and accurate delivery of the target fluid, and a method for completely transferring small fluid volumes to dry surfaces is also provided. A micro-dialysis jacket is additionally provided for the pipettor system to permit desalting, pH adjustment, concentration adjustment, and other functions.